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• EDITORIAL •

Values—The Measurement of Values—The Means for Exchanging Values

"BARTERING" is the best and first means of exchanging VALUES. During the depression of the thirties the papers carried pages of "BARTER" columns. This in itself created a public appreciation of values. Space will not permit the illustration of barter deals, but, doubtless you can readily recall some of the transactions of those days. There was always a VALUE for VALUE trade. As the trading continued the early LOOSE VALUES tightened up remarkably.

As bargaining becomes keener, values tend to become nearer TRUE VALUES. These true values are ultimately based on the labour and effort involved. At all times and places, equal quantities of labour may be said to be of equal value to the labourer. Whether this value be measured in the standard of GOLD, SILVER, or goods produced, it is determined by the labourer or artisan himself. The VALUE for exchange purposes are never the same. The purchasing potential varies in every location and in relation to every commodity. What a Chinese or Indian might take or purchase with an ounce of gold would not be satisfactory in the eyes of a Canadian for his ounce of gold, especially in commodity value.

Similarly it cannot be planned that the labour value can be constant across Canada, even for the same class of employment. One dollar in the Yukon, in purchasing or production power, in 1946, is worth several times the commodity value in Ontario. There are similar comparisons between large and small cities. This has been admitted in the contention that the cost of living is less in any country town than in metropolitan areas.

In the recent post-war years, controls and rationing, as well as subsidies, are nothing more than economic pump priming. The natural laws of SUPPLY and DEMAND can be thrown out of their natural trend for the time being, but the higher the peak of inflation, the greater will be the cellar of depression.

How many of us understand or even instinctively appreciate the relationship of commodity values and the principles of supply and demand? In a few words, it is the demand proportion to the supply that determines the price in exchanges between producer and consumer. When the supply is small or low, the price is high. As the supply increases and the demand is satisfied, to continue trading, the price is lowered. The bottom price is the point where the product can be still sold at a profit by the producer. Then, in reverse, as and when the demand increases over the supply, and there is an unsatisfied demand, the price trend is up. The top limit is the exhaustion of the supply and then also the trading ceases.

These principles suggest that in the present period, trading and economic stability can be attained only by increasing production till the de-

mand is more nearly satisfied. The cry for increased wages to offset the high cost of living might much better be approached by getting down to the business of production and carrying on until the prices naturally come down and then the cost of living will level off in proportion. The loss of production through strikes is having just the opposite effect and producing higher prices and the loss of wages, while personally large to the individual, is not sufficient over the whole economy to tremendously reduce the DEMAND. It does decrease the demand in the locality of the strikes, but elsewhere the demand is static.

It would therefore appear that the white collar worker should promote production and hope that it will reach normal volume before our economy starts on the down hill slump into a COMMODITY DEPRESSION, in contrast to a MONEY DEPRESSION.

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Current Literature Digest

By HAROLD BRICKER, C.G.A., R.I.A.

The labour problem is the outstanding problem in Canada to-day. Those who are solving the problem, or have no such problem, are economically wise and lucky. Those employees who are co-operating by honest work are also lucky to be so situated. "Share the wealth," in business is a psychological and diplomatic means of maintaining the unity of purpose and effort in any business.

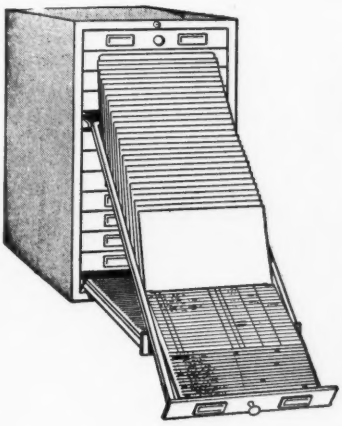
Factory management has recently published an article in which a dividend plan for the employees is outlined. While such a plan must essentially be fitted to the particular business, some points might be gathered from this plan.

A labour dividend of a —% of the profits, before taxes or dividends, subject to verification by independent audit, may be paid to employees, in proportion to their total units of credit, from the following table and in accordance with the rules given:

For each $100 of annual compensation	1 unit
For each year of continuous service	1 unit
For each 6 month term on the junior board of directors during the current year only (max. 10)	5 units
For supervisor	5 units
For assistant department manager	15 units
For department manager	25 units
For specialized personnel and positions, as appropriate and consistent in each case	various

Payment to be made in a lump sum immediately after the end of the year.

Termination of employment voluntary or otherwise, at any time during the year, cancels all participation rights. Ordinarily, layoffs or leaves of absence do not impair participation rights.



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Ordinarily, employees must have completed a year of service before the beginning of the accounting year to share in that year's labour dividend. The company reserves the right generally, to withdraw the plan at an appropriate time and upon due notice.

This plan is submitted as an incentive offer from the owners of the business to the employees. This plan cannot be applied generally in this form but similar plans might offer incentive as desirable and effective.

Rumours, Contentions, Hearsay or Fully Presented Facts

The interest of the employee is naturally with the group that gives him the fullest information. Through presumption, many executives have in this current year, assumed too long that their employees were interested and well informed concerning the business condition and operation, only, too late, to learn that they were more interested in outside groups.

Factory Management, in another article, suggests that executives and business owners can more consistently give employees information which will consolidate their personal interests in their gainful employment. This is done by answering many questions of the employees by such information as might be the answers to the following.

Are the employees interested in our problems of finance, engineering, manufacturing or sales? Do they know anything about these problems?

Have they been taught that employee responsibility goes hand in hand with management responsibility?

Have they been told that in the long run, the company must produce more and more, and sell it for less and less,—if their jobs are to survive?

Have they been shown what the company is doing to reduce costs, simplify work, increase employee earnings, stabilize business, to provide jobs for the future,—and to spend a little less than it takes in?

Has anyone told them that customers keep demanding lower prices?

Do they know that it takes $5,000 in savings to create a job?

Has anyone told them that Canada has obtained, by producing more pieces in less time, a standard of living that 92% of the people of the world cannot attain under any system,—and that this standard can be held only by continuing to produce more units, and in less time?

THE HOUSING PROBLEM,—AS COST ACCOUNTANTS AND AS INDIVIDUALS

Everyone in Canada wants our people and especially our war veterans, well housed, and quickly. Sometimes we overlook the most important contributing factors and their future percussions. No one, however, wants the veterans, or anyone else, to get a lot of severe economic headaches along with the housing. As it stands at present, it would appear that the emergency housing construction programme runs unnecessary risks of having such results.

Here are a few of the reasons:

1. The principal opportunity that the program offers to the veteran, is that of buying a high-cost house,—where a chance to rent would, more often than not, meet his needs much better.

2. During this worst possible time, the program adds substantially to

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the dangers of a runaway inflation, of the sort that inevitably ends in a financial crash.

3. Little practical effort is being made to substantially reduce the arbitrarily high building costs. This besides material direct costs, includes the conditions resulting from restrictions and high wages imposed by labour unions, in some sections, and through antiquated building codes.

4. By giving overriding priorities to unattainable goals of home construction, the program also endangers the volume of industrial construction necessary to sustain full employment.

The Editor of Factory Management and Maintenance has written an opinion on the outlook of industry in the U.S.A. which might profitably, to some extent be transposed to the Canadian outlook.

The results of taking stock in this turbulent time of economic excesses are not so discouraging as the prospect of doing so would indicate.

Some adverse factors could be:

(a) The current negotiations between management and labour have not constituted collective bargaining. They have, rather, represented attempts on the part of labour to enforce collective demands with government support behind them.

(b) The "bargaining table" has been taken to Ottawa, away from the location of the plants cncerned. Unions have not been willing to accept less than the highest authorities in the land in justifying increases.

(c) The cards have been stacked against industry, politically if not deliberately, by the estimates of industry's ability to pay permitted to stand by the Department of Labour, with all its statistical history behind it, until too late to have any but a boosting effect upon wage rates.

There are however, some favourable factors:

(a) There will doubtless be a breathing space ahead in the campaign for higher wage rates. Union leaders know that the very money which supports their idleness must come from their own production. Already the backing of savings is gone for many workers.

(b) The authorities are realizing that our economy is based upon production, and that both wages and taxes must come from the results of that effort.

(c) Price-control by the government is being gradually relaxed. It is nationally conceded that wages and prices are related.

At the present time we appear to be in the period of calm, after the conversion yet before the post-war production activity. Industry is preparing to produce at lower and lower costs so that industry's products can be sold at lower and lower prices. Coincidently, more of industry's products are wanted now by more people than ever before. If products can be sold at lower prices, more and more will have to be produced. This trend should contribute very favourably to the standard of living so that it will go up and up.

Restricted production resulting from the many acts of the "RESTRAINT OF TRADE", can bring only UNFAVOURABLE CONDITIONS, socially and economically.

Cost and Production Control in a Metal Stamping Plant

(By N. R. BARFOOT, R.I.A., Cost Accountant, Galt Metal Industries Ltd.)

This outline of a cost system is based upon one in operation in a metal stamping plant.

As regards the present manufacturing processes and type of industry, it represents a plant of some years' successful business standing. Over that period of time cost records have been kept which were adequate in the days of lush profits but are somewhat antiquated by today's standards. Like all human endeavours it is capable of unlimited improvement. A recent re-organization has introduced many changes and an honest effort has been made to arrive at a compact co-ordinated system. The metal stamping industry is a highly competitive one and especially so in times of normal commercial relationships. It is, then, very important that the highest type of efficiency be developed and maintained in the cost and production control of such a concern.

The relative size of the plant under survey has made it advisable from

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the standpoint of efficiency and operative costs to make the cost system part of the general production planning department. The inter-relation between costs and production was such that it was thought wise for the sake of clarity to describe the entire set-up. This article will deal with the cost procedure from the original classification of accounts in the general ledger through the growth and application of overhead time and material accumulation and distribution, cost statements and reports. Production control is dealt with from the stage of the initial factory order through the development of procedures and facilities, bills of material, cost estimates, scheduling, routing and follow-up of same. The forms in use in connection with the various records are included for further illustration.

In developing this system, the emphasis has been laid upon one operative during peace time. War contracts with their special cost audit features combined with a seller's market have played havoc with ordinary cost and production planning. However, the insistance of the Department of Munitions and Supply upon actual cost results has had a healthy effect on the attitude of most manufacturers, to cost systems.

The company operating under the system described in this article does a general metal stamping business in all lines of pressed metal parts. Largely, it supplies the automotive industry, although many other firms are supplied with stamped parts, e.g.: refrigerator parts and washing machine parts. In addition, a number of types of stamped metal toys and playthings are manufactured and sold under the company name.

A breakdown of the general manufacturing scheme shows as an initial start the various dies for producing the part on order. These may be bought as in the case of large complicated dies, or if small and simple, manufactured in the plant tool shop. Dies used will consist usually of a blanking die, several forming dies and possible trim dies. The number of dies involved depends entirely on the complexity of the part to be shaped, e.g.: a fuel tank body will require but one or two form dies to shape the blank into a rectangle. A tube for an oil filter will require a number of short draws to form and lengthen the part from a flat piece of steel to the finished extended tube. Very often the finished article is an assembly of several drawn parts which are welded together either by spot, seam or gas welding. Annealing facilities are maintained also to soften steel of poor drawing quality, between drawing operations to prevent cracking and tearing.

Degreasing and washing equipment are a part of the industry as most "blanks" of steel are brushed with special oils before running through the press, to help the steel to flow evenly and prevent wrinkling. Subsequently, this oil must be washed off with alkali solutions, or degreased before painting. A large separate paint shop is operated, where most parts are sprayed or dipped before shipping. This department also operates large electric drying ovens to speed up the operations of the paint house. Plating of all kinds and anodizing is carried on in conjunction with the painting activities.

A good deal of tinsmithing has been done in the past, that is, hand soldering of parts together. This practice however is diminishing with the greater use of welding, and in particular, electric seam welding of assemblies such as fuel and oil tanks, which must be leakproof. The final products may vary

from relatively small and simple stamped parts to large assemblies made up of many parts previously stamped and formed.

In any treatise dealing with a cost system one must bear in mind its relation to the other chief divisions of a manufacturing enterprise. The cost system itself touches every other department, either stemming from or furthering each controlling activity of a plant. It is a committee of ways and means for sales and purchasing management, a synthesising agent for production and engineering offices and an encyclopedia of information for all departments.

COST FINDING

Standard Costs.

The manufacturing operations common in a stamping plant make standard costs a fairly obvious choice. The limited classes of mechanical processes and to some extent, limited kinds and types of material make it rather easier to set up standards for performance and material. The expense of cost finding under such circumstances is much less under standard costs, which factor, it goes without saying, makes management happier.

(a) Raw Material Standards.

A complete history is kept in the cost department for price purposes of each purchase of production material. This record forms the basis for setting the material price standards. However, the purchasing agent is consulted in this regard, for possible market trends. It was thought that current rather than basic standards for material was a more intelligent approach. The whole attitude towards the setting of standards has been to base them on expected actual costs and hence to have a variance of a minor nature which would not, when accounted for in the profit and loss statement, be too disturbing to the general picture. Material usage standards are largely determined at the time of estimating and are not too difficult to establish. When the job is in the estimate stage, the size of blanks for the die makers is developed by the engineering department, knowing this material may be bought almost one hundred per cent of the time to blank or multiple blank size. A comparison of finished weight and shear or blank weight quickly shows production shrinkage percentage. A reject or scrap loss of 10 per cent is normally allowed for poor workmanship. Standard material usage is a part of estimates, and is, if job is accepted, used in setting up standard cost record. Special types of jobs involving more intricate press work than usual are, however, the subject of special study by the engineering department, and if there is an anticipated high reject loss, such facts are carefully noted for the use of cost department.

(b) Direct Labour Standards.

The standardization of labour has been, in the past, decided by intensive time study. A complete record of costs of various labour operations over a period of many years has been kept. In the engineering development of the type of work in a stamping plant, the number and class of operations are a result of the number and class of dies needed. These in turn may, and often are, influenced by the type of press equipment available, and material specified. When all of these factors are brought into balance, the sizes and types of presses for the various operations are known. Each press has its full specifications noted as to stroke, tonnage, and more important, speed.

Thus, even in the estimate stage it is known that the article under quotation may be produced, for example in presses numbers 2, 6, 15 and 34. Numerous timings on every press have set a fairly accurate standard rate, taking into consideration however in extreme cases, size and weight of material to be handled. This is, of course, used in conjunction with an established base rate below which a workman's hourly earnings may not fall. The above course of action is currently used in the repetitive type of work of which so much is done in a stamping plant.

On specialty jobs of involved assembly work, time studies are made in a temporary fashion on the start of a run, and when it is felt that all concerned are beyond the learning stage, the job is re-timed and this latest timing fixed as the standard. Jobs which may require development during actual production are sometimes paid by hourly rate during the period of trial and error. Preliminary operational surveys are made at the time of estimating, but often must be changed in actual performance. Another form of standardization used in the payment of labour is that of set-ups. This refers to the placing of new dies in a press and the adjusting of same so that it will produce good stamped parts. Standard allowances are made for this service and are maintained on a sliding scale to cover all types of die setting and changing.

A careful comparison of wage rates in similar industries has been kept in mind in the setting of base rates, and it has been the express policy of management, when low net wages result from unforeseen difficulties, to accept the loss and pay the workers a comparatively good wage. Fluctuations in labour conditions have necessitated much revision since the beginning of the war. At the present time more emphasis is being placed on motion study than on mere timing. That is, the easiest and safest way will be the fastest and best way. In this connection, with labour conditions it is planned to have a job evaluation survey made in order to take a lot of the guesswork out of wage rates and really pay the experienced conscientious worker the proper wages for his qualifications and conditions of work. This, it is felt is a "must" for the future even relationships between management and worker.

(c) Overhead Standards.

The setting of reasonably accurate overhead standards involved a good deal of analysis of past and present expenses. The breaking down of fixed and variable charges was easily done. Cost centres were established by manufacturing division, and were, as stated before, shear, press, cornice, paint, plating, assembly, muffler, tank, condenser and tool departments. In this build-up of a standard burden cost, the variable items of expense as gleaned from the historical costs were somewhat of a headache. There seemed to be no sense to much of the spending, or rather no pattern, so that it was concluded that a good deal of ill-planning and inefficiency had existed. Further study had to be made of manufacturing expense over a period of time coupled with some ideas of budgetary control. This was done over the period of a year's operations to arrive at some conclusions as to what amounts might be budgeted for at the level of production during the year under observation. A lengthy study of plant capacity was made. That is, total capacity with all machines running the average work week for a year. This was found by study to be fallacious as regards actual capacity. That is,

it was found a press might be running at full speed, but, e.g.: shears could cup up enough in half an hour to keep that press in operation two days. Other factors such as die change, unavoidable delay, etc., caused a reduction in estimate of average capacity of the plant to produce and sell to 75% of full capacity.

These several facts regarding plant capacity and overhead expended, that might be under budgetary control, were considered together. In actual effect it was found that only 80% of average capacity to produce and sell had at any time during the period examined, been attained. It was also found that during a drop in production effort to 60% of average capacity, overhead had not decreased appreciably. However, it was felt that this was due to lack of budgeting expenses at different levels of production output. Some attempt was made to establish a flexible budget in this connection. So far, only the more important variable costs such as supervision, operating supplies and maintenance, have analyzed finely for the building up of a budget. Working from a middle point in productive output, a standard overhead in graphical form at varying levels of production from break-even point to overage capacity was set up. This, it must be emphasized, is distinctly in the embryo stages and a good many further improvements are in order.

ACCOUNTING

1. Material (a) Planning.

Upon receipt of a factory order to manufacture, the material clerk of planning department checks inventory to ascertain available balances of materials required. If raw material or purchased parts are needed, the necessary amounts, which are calculated from bills of material originally set up at time of estimating, are requisitioned. These purchase requisitions are made in duplicate, the originals of which after examination and signing by chief engineer, are forwarded to the purchasing department, and the duplicate is material planner's copy. These requisitions contain all necessary information as to size, weight and specifications, as laid down by the American Society for Testing Materials. Delivery date needed to meet production schedule is also asked for. Certain items of raw material used continuously in regular production, are bought as stocks reach the minimum called for in the stores records, but for most of the war orders, this type of buying has been found impracticable. Special steels and purchased parts used on army and aircraft parts have made each job a separate concern for material planning.

(b) Purchasing

Usually considerable shopping around is done by the purchasing agent, but the war influence has to some extent forced him to keep in well regulated channels of buying. Orders must be placed so far ahead that only the mills can be utilized. A stabilization of prices has also tended to eliminate a good deal of asking for quotations. Purchase orders are made in multiple copies numbered serially. The original copy signed by the purchasing agent goes to supplier. One copy stays in purchasing department for follow-up, one copy goes to accounting for comparison with invoice when this arrives. A further copy goes to material planner so that he may check that his requisition has been filled. It also is used as part of the information on the master inventory record which he keeps. Another copy goes to receiving depart-

ment to check incoming goods. Other extra copies, as the need arises, may be made for the material follow-up men who travel around expediting slow moving articles.

Material received is checked in by receiver. This consists of recording quantity, weight and goods description. Receiving report must also be signed by inspector in charge of examining incoming shipments. This report is made in triplicate. The original is sent with goods to stores. Duplicate goes to planning department to be entered in master inventory control, then to purchasing department, who, after noting delivery, sends on to accounting department, who check against invoice which has usually arrived by this time. Any mistake in goods received, however, is caught in receiving department, who notify purchasing. A thorough check is made and purchasing agent decides the best course to follow.

(c) Accounting.

After invoices are O.K.'d by accounting and posted to accounts receivable, they are passed to cost department. There a record is kept of each commodity bought, its laid down price, quantity and usage. This record is a basis for establishing standards on material prices.

A factory ledger is operated in the cost department and inventory or stores is a controlling account. Invoices of production materials are priced at standard cost, and differences or variance noted. Summaries of material received at standard cost are debited to stores account. Summary of price variances is charged to material variance account. Variance statement is made out in detail as to type of material, and if possible, the specific job on which it is to be used is given. This becomes of use in drawing up the case history of any job on which special analysis is wanted. (Price variance is therefore in effect, taken upon receipt of goods.) It might be thought that by this action one might conceivably be taking a profit on the material of job before it is run. However, the close association of this particular organization with the automobile business has fixed the principal of a short inventory in their minds. Stock position is watched very closely and seldom is there more than a thirty days' supply of production material on hand. Inventory turns over from ten to twelve times a year. It must be emphasized, however, that this condition is peculiar to, and probably possible only in, a factory of this sort. The accounting for variances does not provide that they be recorded in the cost of the completed job. The entire price variance becomes a profit and loss item. By putting all variances into the profit and loss statement it was felt that they would be more apparent and more quickly apprehended by management, and that is the condition desired by the cost department. The deviations and their extent are the features of a standard cost system.

(d) Stores Records.

Stores ledger cards used in a kardex file are the basic records in accounting for production material. This is in two forms: a master record of all divisions of the plant, kept in the planning office, and subsidiary records kept in each of the four stockrooms. The master record sheets as illustrated show a section to record goods ordered with such information as date, purchase order number, quantity and due date. Sections for receipts, reservations, issues and balances are also given. An available balance derived from actual balance less that reserved for production has been found very useful. Signals

are used to indicate obsolete stock and approximate days or weeks supply on hand. The subsidiary records kept in the stockrooms are simply in, and out, and balance card records. These are similiar to bin cards and are kept in trays on the stockkeeper's desk. In the case of steel, in addition to the actual weight on hand, a count of number of sheets, pieces or rolls with their sizes is kept. This has been found very useful in quickly ascertaining probable production for a certain sized blank. Receipts and returns of material are recorded independently by the stockkeeper and constant check is made of his records and the master inventory record.

(e) Stores Requisitions.

All materials of a productive nature must be requisitioned. Requisitions for supplies and maintenance are issued by foreman of service department who operates on a monthly budget. However, if he requires some material for service work which is in productive material inventory, he must obtain same from planning office, so that no less of this class of material occurs that is not accounted for. Material requisitions are made out in planning office. These are made out for standard amounts of material set up for the particular job being planned. These material amounts are taken from the approved bills of material. The bills of material have as their basis the original estimating sheet. Material issuance tickets or requisitions have further columns for the amount of material actually sheared. It often happens that some waste accrues in shearing, due to faulty material or odd sized sheets. There is, therefore, a material usage variance obtained right at the first operation. The stockkeeper deducts the amount of material actually used from the appropriate stock car, and returns one signed copy to planning office. Here, actual amount of steel used, is deducted from records and requisition is passed to cost department. It is then priced and material usage variance recorded. As material proceeds through the shop for fabrication, there is perhaps a reject or scrap loss so high that the amount of material issued will not produce sufficient good pieces to satisfy the production order. To obtain more material, a separate requisition must be obtained from the planning department which is plainly marked with the cause. By thus bringing the variation from standard before the users and planning department, the reason for the over-usage becomes more evident, and it was found that there had been a good deal of unwarranted use of extra material. This requisition, of course, becomes part of material usage variance. All requisitions are priced at standard material costs and credited to inventory account. Material usage variances are summarized at the end of each month. Again, as in the case of the price variance, some detail as to the job on which the variance occurs is employed. The total of usage variances is a charge to material usage variance account. This variance also appears in the profit and loss statement.

These variance accounts have been found to be of the greatest possible use to factory management. No other information derived from the cost department seems to get as much study.

2. Labour.

(a) Payment Plans—There are two productive plans in operation—one incentive and one day work. Each job is time-studied by the operations involved in its manufacture. In the computation of the rate to be paid per thousand pieces a base rate is used which, with the usual allowances for

delay, fatigue, etc., will give the average worker a gross hourly wage comparable to other steel industries within the district. On press work, standards have been set which are automatically applied to each new job that begins. Other types of work require new timings as started. This is on a temporary basis for the first few days until the worker is accustomed to the job and the equipment. A retime is then made to check the accuracy of the first, and a standard permanent rate set for the operation under survey. These rates, when standardized, are part of the standard costs of the job, and are the basis for payment on the daily production of the workers. A certain proportion of work done which is rather hard to control and difficult to put on an automatic production line or semi-automatic line, is done on a productive day-work plan. This method is discouraged as much as possible, and any big increase in the percentage of day work to piece work is occasion for discussions with engineering and foremen. It has been proven quite often that even small runs of comparatively intricate assemblies can be most profitably put on a production assembly line and carefully studied for time and motion.

Non-productive labour is largely paid by hourly rate. Service department men, shipping room men, die setters, tool-makers, etc., are on this basis. Firemen, watchmen, janitors and guards are paid by salary. Also included in this are some supervisors and planning room clerical help. A certain amount of die-changing and adjustment and repair is carried on by skilled tool-makers and die setters. There is, however, a standard allowance made for time involved in setting dies ranging from twenty cents to as high as two dollars. This is, of course, in the case of dies belonging to jobs which may have been running for some years without radical change. This set-up time is treated as part of factory overhead expense.

(b) Timekeeping.

The usual type of clock or gate card is used to accumulate the hours during which an employee is present in the factory, which is on a bi-weekly basis. This is made up in advance with man's number and name printed in the appropriate places. The clock card also has spaces on it to take care of the multitudinous deductions current today. The back of this card is laid out so that the number of hours of piece work, day work and various kinds of indirect labour may be entered. This is, of course, used in the pay-roll analysis. Clock cards are removed from racks each morning after seven o'clock, and time clerks enter in previous day's hourly total. This is checked against time accumulated on job tickets for the same day. This removal of clock cards also serves to check on late-comers, and absentees, who must report to supervisors or personnel manager before beginning work. In connection with the clock cards, attendance records are maintained which show time lost and reason. This is used to determine holiday allowances for factory employees. This type of record is obtained for the personnel statistics.

For the original record of time spent on a job and production received, a daily time card or job labour card is used. This is marked in advance with man's number, group and name. A column for starting and finishing time is given, with further columns for the accumulation of hours, job number, part number, operation, quanitity produced, rate per thousand and total. These cards, bearing each man's number, are daily put in racks in the de-

partment in which he begins work. Before proceeding to a job, he records his starting time on the card by means of a job time recorder which measures hours in tenths. The worker obtains the job or release number and part number from the production routing ticket which goes with each box or pile of material through the various stages of fabrication. The operation name and number is also acquired from the routing ticket. Counters on the presses record the total number of pieces run through. The inspection checkers, however, physically examine and check the work produced, and in the case of a large number of bad pieces for which it is established that the workman is at fault, the quantity produced and marked for payment on the time card, may be changed from that shown on the press counter. The fact of knowing that there will be an operational inspection and count, in itself influences the attitude of a sloppy and dishonest workman so that changes seldom have to be made on this account. On the other side of the picture, the company guarantees to the workman that his equipment is in good running order, that dies are properly working before the actual run and that material is bought to specification for the job. All the above information is recorded on the daily time for each job worked on during the day. Productive day work cards are filled in the same fashion. Indirect labour is marked on by hours spent at whatever service is performed. In the case of machine repair or building repair, details as to whereabouts of such work are given. Each night, cards must be O.K.'d and signed by department foremen as to accuracy of information given. These cards are collected each morning and sent to production office. Here, the information on them relating to quantities produced, are checked into production records. Accumulative totals of each day's production are kept. Some types of mistakes can be ascertained here. That is, by comparing operational production in sequence, discrepancies such as running one thousand pieces through shearing and then a run of one thousand two hundred blanks through first press operation may be seen. Of course, in actual practice the tendency is for a decreasing number of pieces to go through in succeeding work. In this production control over the record of each manufacturing order the standard production set-up for order is kept. As soon as this point is passed, the checking clerk marks the labour card with the difference. In this way, the performance variance is caught by the cost department. After this work is done by the production office, the cards are forwarded to the cost department. The cost clerks enter on the daily time cards the job operation rates from the standard cost card records. These are multiplied against the quantity produced and the result is the earnings on the job. A separate record is kept of the employees' total daily earnings by piece work and productive day work and the difference between this and the total of his hours, times the guaranteed base rate and constitutes bonus. This is kept as a daily percentage and accumulated for the pay period. Some operators work as groups on special jobs, and in this case, a group bonus is kept. If these bonus earnings become non-existent or drop below base earnings the attention of the supervisor and plant superintendent is called to this, and corrective measures applied to the job by way of new timing or operational procedure as required. An arbitrary figure of base earnings plus one half is allowed as a gross pay. Bonus earnings greater than this are carried forward for the inevitable rainy day. In the same fashion, an advance on earnings is sometimes thrown in to help

a poor pay total. Productive day work is priced at base rates, and indirect labour paid at set hourly rates or salary as the case may be.

(e) Payroll.

As described before, accumulative earnings day by day are kept of each worker or group. This is on a special record. The clock cards are collected on the Monday morning following the end of pay period. The hours which have already been totalled for each day and checked against daily labour cards for any differences in time, are added for the entire period. Total hours are extended against workers' base rate which constitutes his base earnings. The difference between this total and the gross earnings by piece work is entered as bonus. National Defence Tax, unemployment insurance and other deductions are listed by amounts on the face of the clock card in the spaces provided for same. An accounting machine is used to write up the permanent payroll record. This includes pay envelope statement of gross earnings, deductions and net pay. At the same time, a master payroll sheet is typed containing the same information. An employees' record of earnings is also made in the same process which is his personal company payroll record. This, of course, becomes the source for income tax information. A running total of earnings shows when completed, the total payroll for the plant. This, less the deductions, becomes the pay due to employees. Payroll is drawn in cash on the Friday following ending of pay period, and envelopes are filled by pay clerk. These are distributed the same evening.

(d) Labour—Analyses and Variances.

The total payroll is analyzed firstly into indirect and direct labour. The indirect labour is broken down into the following classes: supervision, clerical, shipping, inspection, first aid, janitor, fireman and watchman, servicing set-ups, miscellaneous stockkeepers, draftsmen, truck drivers, overtime, building repair, equipment repair. These, of course, are totals for the whole plant.

The indirect labour is further broken down by cost centre. Direct charges to each centre are shown and overall charges are pro-rated by whatever method is most suitable. These analyses of payroll are used for determining in part, proper burden charges over the various producing departments. Direct labour is split up into the standard amount incurred and variance, which is usually a performance variance.

The full amount of payroll is charged to payroll account in the general ledger and credited to bank. Work in process account is then debited with standard, and labour variance is credited with variation figure. Offsetting credit is for total to payroll.

The treatment of labour in the tool room provides some changes from the standard practice. Part of the work done here is maintenance of dies, machinery and all sorts of equipment. The remainder is work on the production of new dies, many of which are sold with jobs and become the property of the customer. Job costs are kept in this connection. All labour from the tool room is accumulated under the tool room order number. The labour expended on maintenance and shop repairs becomes overhead, which is distributed in the payroll analyses to the various departments for which the work is done. The labour on new dies, etc., is productive day work. The tool room products are costed separately and no attempt has been made to introduce standards.

OVERHEAD

(a) The manufacturing expense ledger contains the following account groups:

1. Operating Supplies.
2. Salaries and Wages.
3. Fixed Charges.
4. Power, Heat and Light.
5. Maintenance.
6. Miscellaneous.

It has always been easy, in fact too easy, to merely collect all overhead charges of whatever nature, and throw a blanket burden rate over all manufacturing operations. Close competition on some items of production has prompted considerable research into this business of overhead. One of the results has naturally been some analysis of expenses to determine overhead rates on established cost centres.

Expenses have fallen into six general classes, of which one consists of a series of items labelled "fixed charges". The other five are composed of expenses which are variable in character. The idea behind this analysis has been to properly distribute these expenses, thereby obtaining control of such expenses, thus making it possible to strike pre-determined burden rates and to establish expense budgets. The plan has not been carried to the ultimate, but some progress has been made and more will be made later.

(e) Accumulation Analysis and Distribution of Factory Expenses.

The cost department is primarily responsible for the gathering together in summary form, of expenses. This, in the case of some few items is done by general accounting, but the summations go to the cost department for analysis and distribution. Operating supplies are not divided by actual usage in departments except in the case of certain items such as solder and plating materials of which the exact place of usage is known. The balance of material used as supplies is treated as a lump sum as far as analysis is concerned. As far as small tools are concerned, these are charged to expense at time of purchase. Some thought has been given to the idea of capitalizing tools in a special account and re-valuing them at each inventory period. The balance of the account after stock evaluation would represent tool expenses for the period. The bulk of general factory supplies is distributed for overhead purposes on the basis of productive output of each department. This procedure is perhaps a little rough, but lacking inventory procedure on supplies, some method of distribution must be used. Salaries and wages are analyzed from the payroll and form a permanent part of this report. The various sections such as supervision, clerical, shipping, etc., are accumulated first as totals for the plant. A primary distribution of amounts directly chargeable to departments is prepared. Such items as clerical, stockkeepers, draughtsmen, truck-drivers and general plant supervision are distributed by departments, according to number of employees. Shipping and inspection by productive output. Firemen's and watchmen's expenses are pro-rated over the plant by departments, and in this case using floor space as the distributing basis. The labour expenses have always been analyzed rather finely and subsequently good control can be kept.

The figures for the fixed charges are of course obtained from the

general accounts. Depreciation is distributed in the case of machinery, to the department containing the machine, and in the case of buildings, proration by floor space.

Taxes and insurance are distributed on the basis of floor space. Compensation is apportioned by the number of employees in each producing department. It perhaps should be mentioned here that in the cost control of this plant, no cognizance as yet has been given to a secondary distribution of expenses. The line between service departments as separate from producing departments has not been drawn, and therefore there has been no distribution of service department expenses over producing departments. The stores may be said to be a service department, and in the case of prorating certain expenses by floor space, there would be some unbalance in the picture. However, in speaking of floor space, total expenses involved have been treated as being distributed over total floor space, represented by producing space.

The fourth account group in the manufacturing expense ledger is power, heat and light. Power costs, which are electric, are not metered by departments. A total of horsepower rating of all electric motors was taken. The total power bill was then pro-rated among the different departments according to horsepower in each. The costs of coal for heat is spread around the producing departments according to the number of unit heaters in each. In this connection, about half of the steam bill is apportioned to one producing department in which a washing and degreasing unit is operated. A considerable amount of natural gas is used in gas fired furnaces, for hardening and solder work. The costs of this item are allocated to the departments in which it is used, based rather roughly on the number of outlets of various sizes in use. Compressed air has a wide and diversified use in this plant. Nearly all presses of the smaller sizes and of automatic action use air jets to throw out the formed metal parts from the dies. Large amounts of air are also used in spray painting and in sandblasting a preparatory stage to metallizing. The chief costs in this connection are maintenance of the compressors and air lines. Separate compressors for each producing department requiring air makes the distribution of this expense quite easy. Electricity used in lighting is apportioned on the basis of number of units in use in each department. The tools and maintenance charges on the power, heat and light producing facilities are accumulated separately and distributed on the same basis as the fuel costs.

The maintenance account consists of two sections, building and equipment repair. These repair charges are accumulated from two sources, namely, the payroll report and general purchases of repair parts. The labour spent on repairs is analyzed in the first instance into building repairs in general and equipment repair by departments. Building repair account containing labour and materials used is allocated over the producing departments according to floor space. Equipment repair includes a large quantity of replacement parts for machinery. The cost of these is distributed to the department in which the equipment to be repaired is contained. Labour in this instance is analyzed from labour tickets which specify the machine or press worked on.

The miscellaneous account contains sundries of all costs not classified in

previous accounts. These are pro-rated over the producing departments according to productive output. Unemployment insurance has been put into this classification, although perhaps not correctly so. It is, of course, distributed by the numer of employees in each department.

(c) Expense Distribution Sheet.

The different analyses are made on columnar pads using up to twenty-eight columns if necessary to get all the information on one sheet. Summaries are also made on columnar sheets. Payroll analyses are made out as a part of each payroll report for each period. Other expenses arising from the purchase journal are analyzed once a month. Each six months a close study of the expenses and graphs are made in relation to direct labour expenditure. These are used instead of actual figures for management perusal. While no definite amounts are allocated on a budget basis for the different variable expense items, an explanation is required when these expenses exceed in percentage, the previous six months. A certain amount of control is achieved by the application of the principles mentioned, and while not by any means complete, a good deal of satisfactory results are obtained. The final results of the expense distribution lead to an actual overhead for each department. As stated before, in discussing overhead standards, by study of these actual overheads in each cost centre, it becomes rather easier to establish standdard burden rates. These are used in estimating, and of course in the accounting for overhead variation, the use of the standard rates in the cost of sales against actual expenses incurred, becomes the burden variation. This is duly carried to profit and loss as in the case of the other types of variation.

(d) Sales and Administrative Expenses.

These are regarded in the light of a commercial overhead to be levelled as a percentage on the factory cost. This figure is used, however, in estimating and in actual statements of costs of jobs or parts produced, does not appear. That is, no figure or percentage appears in the cost of sales statement as administrative expenses. Actual expenses in this regard are added to cost of sales summary in profit and loss statement. It has been felt that to include all or even a portion of sales and administrative expenses in factory burden would inflate work in process inventory and defeat the purpose of a conservative appraisal of stock.

COST OF SALES STATEMENT

A summary of the accounting for labor, material and overhead which leads to the cost of sales statement is as follows:

All of these transactions described are worked out by cost centres. Raw material purchases are charged at standard price to stores. The price variance is taken at once and the offsetting credit is to accounts payable. Raw materials issued for fabrication are debited to work in process. Usage variances are obtained at the same time and stores credited for total amount used in manufacture.

Direct labour incurred is charged to work in process at standard rates and usage. The variances are estimated as a debit or credit as the case may be, and actual amount incurred is credited to accrued payroll.

Overhead costs applied are charged to work in process at standard rate and credited to cost centre at same. Actual overhead is distributed to depart-

ments as a charge; the offsetting credit to accounts payable. Overhead variances are picked up at this point.

All variances are transferred to profit and loss. All finished goods are shipped as soon as finished and none are held for stock. This procedure, a common one in this industry, has more or less done away with a finished goods account. Cost of sales account can, therefore, be charged with total cost of goods sold, and the corresponding credits are to work in process, material, labour and overhead.

The cost of sales statement is rather an extensive document since it is broken down in great detail.

The billing clerks prepare from the lists of shipments, a breakdown of goods sold, by classes of products. This may run as high as three or four hundred separate items. A total of the shipments of each part or article during the month is given. This sales distribution sheet is further classified by customer. All cost computations are based on one thousand units. This idea is carried throughout estimating, time study, material standards and any other part of the business where units of production are considered. The standard cost therefore per thousand units as taken from the standard cost record cards, is extended against the number of units shipped and a cost of goods shipped by labour, material and overhead is obtained. The sum total of these individual extensions is of course the cost of sales for the current month.

A number of dies and tools for re-sale are made in the factory tool room. The costs of these as described previously are accumulated on a job cost basis. When the die is finished and shipped or put into use, the customer is billed; the billing value becoming part of dies sold account of general sales. As far as the cost of sales statement is concerned, the actual cost of the die sold is added thereto as a part of it.

PRODUCTION CONTROL SYSTEM

The importance of the connection between cost functions and production functions in a metal stamping plant cannot be too highly emphasized. This is an assembly type of concern, producing both to standard and special orders. Even in a cursory examination of the organization plan, it is obvious that material control and time study are of vital concern to the work of the cost department. They are, however, of equal and necessary value to production affairs. As far as this treatise is concerned, production control is being handled as a separate item, but those sections of the system which are of interest to the cost department as well, and have been fully described in other sections, will not be developed here again but only touched upon sufficiently to give the proper continuity.

1. Estimating.

Some of the preliminary work incidental to production control is done in estimating. In addition, certain information peculiar to the production department is of great value to the estimator. The locale of the estimating department is in the cost department, but a completed estimate on a new or repeat job involves work on the part of the engineering, drafting, planning, cost and production sections of the organization.

A request for quotation on a job is forwarded to the cost department

in the first instance. If it is a request on a similar part made before, the old records are checked, brought up to date as to labour and overhead conditions, and the engineering department is asked to check the job processing plan for possible changes which might improve the cost picture. A cost estimate memorandum is then forwarded to the sales department who make the official quotation to the customer.

In the case of new work, a quick survey is made to establish the desirability and suitability of the part. This point settled, the incoming prints and relative information is forwarded to the engineering department. Here, a bill of material is drawn off by the drafting section and a careful estimate made of the number and type of press operations required to fabricate. One of the most important parts of the estimate done in the engineering department is the calculation of the cost of the dies, tools, jigs and fixtures that may be used on the job under survey. A factor which influences greatly the cost of the dies and special tools, is deciding whether or not these can be made in the plant tool room.

When this work is completed the results are returned to the cost department. Here, the material estimates are priced and allowances for scrap made. From the standard rates used on the various machines, all the press operations are priced. Assembly operations must be priced in the more exact sense of estimating. That is by comparison with previous jobs of similar construction, experience and general knowledge of this particular plant. A study of the performance and capacity of the machinery that will be used on the job if received, also gives information as to the ability of the factory to delivery on customer's schedule or to better it. This, of course, is used in conjunction with the master production schedule. Material position is also taken into consideration in this decision of the acceptance of customer's schedule. Current factory overhead is added to the estimate as well as profit margin and administrative burden, and completed estimate given to sales department. Our estimates are made in very careful fashion, since they are used as a starting point in production planning when an order for a new part is received.

2. Production Planning.

Purchase orders from customers are received by the sales order division. These are checked against the quotation made previously, or in the case of repeat orders, with present performance as to costs, and if found correct a production order is made out. Copies are sent to the production office, cost office, shipping office and engineering. It is understood on this procedure that no action is taken by planning department until engineering has thoroughly checked the job. The engineering and drafting departments using their copy of the original estimate, draw up bills of material. These bills of material are made up in a standardized form showing blank sizes, weights and gauges of steel to be used per thousand units. This also applies to purchased parts.

Copies of this material specification sheet go to material control and the cost department. The material planner, after due consideration of the available balances in inventory, will proceed to requisition the quantities needed, on the purchasing department.

These material requisitions, or orders to buy, are made out with all

specifications as to size, weight, gauge and any other description needed. Delivery needed to meet production schedule which in turn must meet customer's desired delivery date, is also specified. Some consultation with the chief production clerk as to when the job is planned for factory work, has some determinative value in this. That is, the job may be run a month before delivery is needed, to catch a spot in the master manufacturing schedule where all presses are idle which are required and the order can be run with the most economy and least confusion. As soon as the purchasing department has made out orders against the material requisitioned, a copy of purchase order is sent to the material control man. This notifies the production department that material has been ordered, and can act as a follow-up of production on purchasing.

Engineering also re-plans from the original estimate a schedule of machine operations. This end of the new job is thoroughly studied, and any short cuts or improved methods not found at the time of estimating, are, if applicable, introduced now.

At this stage, engineering also makes up, as a result of the fixing of the number and type of machine operations, memorandums to purchasing to buy tools and dies needed on the new order. In this instance, engineering usually specifies its own sources. Tools and dies to be made in the factory tool shop are requisitioned in the form of a tool shop order on the production department, who in turn check these orders into the tool room for manufacture. A careful schedule of tool room activities must be kept so that at the time a job is ready to be sent into the shop, the tools, dies, jigs and fixtures will be ready.

Copies of the shop operational schedule are sent to the cost department and production planning department. It might be explained here that the copies of materials bills and machine operation sheets are sent to the cost department as a means of setting up a provisional cost on the standard cost record cards. Prices for both of these are of course obtained from the original estimate. The operational schedule lists, in addition to full job identification, a complete list of labour operations and type of press or machine needed. It is encumbent upon engineering also as the job goes into production, to follow it rather closely in order to iron out the bugs and wrinkles that may arise.

In actual practice, this information from the engineering department flows to material and production control at one and the same time. The work of these two functions is done simultaneously. The real work of the production department now comes to the fore.

3. **Routing.**

A certain amount of the problem of routing has already been solved in the operational schedule prepared by the engineering department. Additional information received at the same time includes blueprints of each part and assembly, full specifications of materials and inspection data with limits and tolerances. From this accumulated material, route sheets are prepared. These have the following information:

1. Number and date of order.
2. Part number and name—general assembly name and number as well, if part is a sub-assembly.

3. Number of press to be run.
4. Quantities to be run on each release.
5. List of operations in sequence of handling, including: (a) Departments in which work is to be done; (b) Press or machine to be used for each operation.
6. Rate at which each operation or lot is to be completed.
7. Scrap or spoilage allowance.

The filling in of the route sheet involves knowledge of machine capacity, general arrangement and lay-out possibilities of the plant.

Machine capacity has been the subject of considerable study, and an accurate record has been set up of the total capacity in terms of time of the presses, shears and welding equipment. The machines have, of course, their rated speeds. The other two factors in estimating production are the set-up time and method of handling material in and out of the dies. Set-up time, providing the die setter is skilled, is determined by the size and complexity of the die, and in some cases, the extra care needed for close tolerance stamping. With a more or less awkward type of stamping in which it takes extra time to nest the blank or partially formed piece, running time will be lengthened. Automatic feeding of strip steel will sometimes cut down on this lag in intricate operations. A good many of these problems are ironed out in engineering by way of operational directions. In assembly line and semi-assembly line layout work the problems are more difficult, and when once the proper sequence of work is lined up, thorough time and motion study is applied. Provisionally, however, past performance on similar jobs and general shop experience must be relied upon in setting any time values to job operations.

The route sheets are made up in sufficient detail that they will act as complete instruction for the departmental foremen. This applies to the greater percentage of the jobs undertaken, as most of the work in a stamping plant is an application of relatively simple mechanical principles. Large and complicated assemblies require a good deal of further work on the part of engineering and supervision after production has begun.

4. **Scheduling.**

There are, in general, two branches to the problem of scheduling in this plant. A tentative master schedule prepared on a three month basis, and a more definite and detailed plan by week and day. This concern is a jobbing plant and intermittent manufacturing of lots or job orders is the rule. As soon as the product has been analyzed into parts and processes by the engineering department, the work of the chief production clerk begins. First of all, the required date of delivery must be taken into consideration. This determines the general priority of one job over another. An estimate of the time to be consumed by the job is gained from the route sheets. This also has a bearing on the schedule. This master schedule, however, is very general as far as starting times for jobs in concerned. A certain amount of time is deliberately left free to accommodate special rush jobs for preferred customers. The route sheet has already assigned work to the exact machines, and from this the machine load is known. This information is transferred to machine load cards which are kept for each piece of equipment in use. Capacity of departments is also taken from this same file.

A detailed production schedule is worked out by the week. Operational sheets are in use which list in columnar fashion by processes, the progress of each job through the plant. Each operation column will have entered on it the name of the operation plus the weekly requirement as originally scheduled. Operations are carried across the operation sheet in sequence, so that the flow of activity is seen and the place where a hold-up occurs is quickly noticed by the piling up of number units in some places and the diminution of same in others. These operation sheets are kept posted daily from the daily time cards of workers. To some extent, a daily check is made on quantities so that any adverse trends may be reported at once. In conjunction with this progress control a separate record is maintained, showing only number of units shipped to date on orders and quantities ahead or behind schedule. A daily report on idle machinery and full explanation of reason for idleness is given, or in the case of repairing, an estimate of down time. A short daily production meeting is held between all interested sections of factory management, for the purpose of considering any abnormalities in the schedule.

5. Dispatching.

The mechanical work of keeping records, carrying instructions to the shop and bringing back completed forms is performed by the production clerks. Route sheets which act as job tickets are put in celluloid envelopes and attached to the shop truck carrying scheduled material from the steel stores to the press room. These follow the job to completion. Stores requisitions are delivered at the same time as route sheets to storekeeper, for issuance of material. Daily time cards are collected from each department every morning along with written report by foreman of production. Set-up time is also written up by supervisor of die setters and turned into planning office. Inspector's scrap reports are also sent in daily, and their figures must coincide with loss shown on the operational sheets as parts move through the various processes. The necessary information to start jobs is prepared and given out on a weekly basis to foremen. When the final inspection has been made on a part or finished assembly, completed route sheets are returned to planning office for filing, and any notations of the job history needed for future information are made.

Not all of the complete planning outlined above is used in the case of small special orders. These are merely given a manufacturing number and sent into the shop at times when they will not interfere with the larger planned orders.

CONCLUSIONS

There has always been a good deal of discussion for and against the use of standard costs. Their application in this industry shows, in my opinion, an objective analysis of the situation that is commendable. They have been in operation a number of years and have proved their worth. Fortunately, they were not superimposed on job costs, and have no hangovers that would result from such action. A popular fallacy in changing over from job costs to standard costs or an attempt to run them together is to charge all actual labour, material and overhead to a job until the standard cost figure for the number of units involved, has been reached, and then

charging the excess to variance. No such occurrence takes place with the system extant in this plant. Variances are taken as they occur with the resultant control over unfavourable trends. The use of variances has been a realistic help to the management in gauging properly the factory performance. A good percentage of the work done in this plant is obviously of a standardized nature and standard costs are quite easily applied. We have found, however, that not a great deal more trouble was needed to apply standards to more complicated and intricate types of work. On the cost of costing side of the picture there is, of course, an extremely potent argument. All the way through the costing picture from the pricing of stores at standard prices to preparation of reports, there is, by using standard costs, a distinct saving in the expense of the cost department. There are still some rough edges on this system but it is hoped that they will be trimmed as time goes on.

The most elaborate part of this cost production story is the production control set-up. It will be thought perhaps, that the plant is overloaded with system, but when it is realized that a good part of the production goes to the automotive manufacturers, a complete set of controls is imperative. One of the prime points of factory management, as far as the big automotive firms are concerned, is running on the principle of short inventories. This can only be done by extremely strict delivery schedules and quick cut-backs to the suppliers as their assembly line gains or loses momentum. This can work very badly for a plant whose production controls are absent or very loosely operated.

The arrangement in this plant has been operating for a few years now and has been quite successful. However, the pressure of war production has shown up some defects. A production planning board recently instituted by the management, and consisting of the cost accountant, engineer, general superintendent and chief production clerk has been formed to look into the matter.

There has been but little work so far on budgeting control, job evaluation and other newer but nevertheless essential functions of factory management. Some tentative plans in this regard are formed, and it is expected that they will mature in the future.

« STUDENT SECTION »

COST ACCOUNTING

Comments by A. Van Harris, C.A.

SOME OBSERVATIONS ON THEORY QUESTIONS IN EXAMINATION PAPERS

From time to time the writer of this section has commented upon the manner in which candidates in examination set forth, or in numerous instances, entirely ignore simple questions of accounting or cost accounting theory. In the recent examinations under the auspices of this Society and in examinations written by the students towards their university degrees, either recently, or in the batches of paper which the writer will go through in the next week, the theory questions were, or it is predicted will be, very poorly answered.

The first question which the observer might ask is whether the people who teach the accounting courses should not put more emphasis on the points in theory. And about all the lecturer can reply to this query is that the course he teaches is essentially a course in theory, with illustrations of the practical aspect of that theory. It is possible that the student may gain the impression that the illustrations are the course, as for instance the rather involved problems which are developed on budgetary control, but it is certainly the hope of the lecturer that the theory of the course is being mastered, which in turn enables the students to properly attack some of the problems which appear in class or examination.

Moreover the student obtains from the lecturer, or in correspondence course, the presentation of material in one fashion, and is repeatedly advised to read the same material in standard texts—usually two or three different books, first to supplement the data which the lecturer has presented, filling the background and details which would enable the student to understand the principal points of the subject, and secondly to obtain the different method of presentation which accompanies each author's work.

To return to the examination questions on this theory, it might be beneficial to the student if he understood how many such questions are developed. In the junior courses, the tendency is to choose a topic from the subject matter and quite baldly set a question which commences "Define the following" or ,'Briefly describe", etc. The answers are available word for word in the standard accounting texts, and are so easily available that the student should know them and be able to reproduce them accurately and completely. The subject matter is not involved and to the conscientious student who has worked on his course, they represent a bonus which is readily gained, and which after all he deserves.

In the more advanced courses, it is generally observed that the questions have been built up. Illustrations are not at hand (the writer's on holidays) but, for example if it is desired to test the student's knowledge on how to treat unabsorbed overhead, instead of setting a question of "How would you

apply unabsorbed overhead", the question has been expanded to show "the X Co., (1) with opening and closing inventories of Work in Process each with their respective elements of cost (2) with a rate for applying overhead, which is not sufficient to take care of actual overhead expenses, (3) with a substantial unabsorbed balance, and possibly some other statements which may or may not be relevant, discuss how you would apply the unabsorbed overhead". The question has not changed. The examiner still wishes the candidate to express himself, only in the second instance the discussion applies the theory to the specific question. If the theory is known the question is not difficult and the extra effort that the candidate has had to put into reading, the more involved wording has probably gained him an extra five marks.

Problem No. 1

The Gordon Steel Company divides its factory into four productive departments: (1) Melting and Pouring; (2) Molding; (3) Core Making; (4) Cleaning and Grinding.

Details regarding its factory are:

Department	Floor Space (sq. feet)	Value of Machinery and Equipment	Direct Labour Hours	Machine Hours	H.P. Rating
Metal and Pouring	450	$2,000	24,000	10,000	10
Molding	450	500	30,000	6,000	5
Core Making	900	2,500	12,000	14,000	10
Cleaning and Grinding	1,800	3,000	36,000	20,000	25
	3,600	$8,000	102,000	50,000	50

For the six months ended June 30th, 1946, the trial balance of the Company's production ledger is as follows:

Depreciation Factory Buildings .....$	792.
Depreciation Machinery and Equipment	800.
Direct Labour—Melting and Pouring	12,000.
Molding	14,400.
Core Making	6,000.
Cleaning and Grinding	15,600.
Direct Materials—Melting and Pouring	24,000.
Molding	8,000.
Core Making	10,000.
Cleaning and Grinding	12,000.
Heat and Light	1,080.
Indirect Labour—Melting and Pouring	9,000.
Molding	3,500.
Core Making	1,100.
Cleaning and Grinding	3,600.
Power	1,500.
Supplies Used—Melting and Pouring	600.
Molding	540.
Core Making	2,200.
Cleaning and Grinding	1,700.
Taxes—Factory Buildings	288.
Machinery and Equipment	144.

Workmen's Compensation Insurance—		
Direct labour only	720.	
Factory Ledger Control		129,564.
	$129,564.	$129,564.

Required:

1. A distribution sheet of the manufacturing expense items, showing the apportionment to each department, and specifying the bases used.
2. Manufacturing expense is applied to production by rates established separately for each department. Determine departmental rates for distribution to production. For purposes of illustration determine rates for each of the four departments on a different basis.

Comments

On a problem of this kind the student tends to do very well or to miss the point to the problem, and so make up a statement distributing the direct material and direct labour as well as the overhead. This latter type of statement would indicate to an examiner that the student cannot differentiate between direct and indirect expenses. There is, of course, some variation in the "basis of distribution" of the respective items, and any reasonable basis would be satisfactory.

Solution to Problem No. 1

(1)

GORDON STEEL COMPANY
STATEMENT OF DISTRIBUTION OF MANUFACTURING EXPENSES
for the six months ended June 30th, 1946

Item	Basis of Distribution	Melting and Pouring	Molding	Core Making	Cleaning and Grinding	Total
Deprec.—Factory Buildings						
—Machinery and Equipment	Floor Space	99.	99.	198.	396.	792.
	Value of Machinery and Equipment	200.	50.	250.	300.	800.
Heat and Light	Floor Space	135.	135.	270.	540.	1,080.
Indirect Labour	Actual	9,000.	3,500.	1,100.	3,600.	17,200.
Power	Horsepower Rating	300.	150.	300.	750.	1,500.
Supplies Used	Actual	600.	540.	2,200.	1,700.	5,040.
Taxes—Factory Buildings	Floor Space	36.	36.	72.	144.	288.
—Machinery and Equipment	Value of Machinery and Equipment	36.	9.	45.	54.	144.
Workmen's Compensation Insurance	Direct Labour	180.	216.	90.	234.	720.
		10,586.	4,735.	4,525.	7,718.	27,564.

(2) Rates of Distribution of Overhead

(a) Melting and Pouring Department—Basis—Direct Material ..... $\frac{10586}{24000} \times 100 = 44.1\%$

(b) Molding Department—Basis—Direct Labour Cost ..... $\frac{4735}{14400} \times 100 = 32.9\%$

(c) Core Making—Basis—Direct Labour Hours ..... $\frac{4525}{12000} \times 100 = 37.7\%$

(d) Cleaning and Grinding—Basis—Machine Hours ..... $\frac{7718}{20000} \times 100 = 38.6\%$

(c) Core Making—Basis—Direct Labour Hours ..... 1929 x 100=37.7%

12000

(d) Cleaning and Grinding—Basis—Machine Hours ..... 7718 x 100=38.6%

20000